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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/815,267	03/23/2001	Hiroyuki Onishi	028567-0105	4564

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EXAMINER

KIM, CHONG R

ART UNIT PAPER NUMBER

2623

DATE MAILED: 06/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/815,267

Applicant(s)

ONISHI ET AL.

Examiner

Charles Kim

Art Unit

2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-11,13-20 and 22-27 is/are rejected.
- 7) ☒ Claim(s) 3,12 and 21 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3</u> . | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 5-9, 14-18, 23-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Referring to claim 5, the phrase “accumulation-adds a pixel value of pixel around each pixel of a plurality of similarity degree images arranged in a predetermined direction to a pixel value of the other pixel” in lines 4-6 renders the claim indefinite because it is unclear what is being claimed. More specifically, it is unclear which pixel values are being added. For examination purposes, the phrase will be interpreted as “accumulation-adds a pixel value of a pixel around each pixel of a plurality of similarity degree images arranged in a predetermined direction to a pixel value of another pixel”. A similar rejection is also applicable to claims 14 and 23. Appropriate correction is required.

Referring to claim 8, the phrase “the similarity degree images additionally added by said accumulation addition unit” in lines 3-4 lacks antecedent basis. ”. A similar rejection is also applicable to claims 17 and 26. Appropriate correction is required.

Claims not mentioned specifically are dependent from indefinite antecedent claims.

Art Unit: 2623

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 4, 10, 11, 13, 19, 20, 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okabayashi et al., U.S. Patent No. 6,721,462 ("Okabayashi").

Referring to claim 1, Okabayashi discloses an apparatus for searching corresponding points between an input image and a reference image which is an object of comparison with the input image, said apparatus comprising:

a. a similarity degree image production unit which produces a similarity degree image having a similarity degree between the input image and the reference image as a pixel value (col. 2, lines 14-43 and figure 7. Note that the distribution of the correlation values is interpreted as the similarity degree image)

b. a corresponding point detection unit which detects corresponding points between the input image and the reference image based on the similarity degree image produced by the similarity degree image production unit (col. 2, lines 38-44).

Okabayashi does not explicitly disclose that the similarity degree image production unit produces a plurality of similarity degree images. However, Okabayashi explains that in the case of a 16 pixel x 16 pixel reference image, the reference image is divided into four partial images (each having 8 pixels x 8 pixels), and the correlation operation is performed for each of the

Art Unit: 2623

partial reference images to obtain respective correlation values (col. 18, line 21-col. 19, line 4).

The Examiner notes that the similarity degree image is produced based on the correlation values for each reference image (col. 2, lines 35-43). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to produce a plurality (in this case four) of similarity degree images based on the respective correlation values for each partial reference image. The suggestion/motivation for doing so would have been to detect a position of a pattern which is similar to the pattern of the partial reference image in the search/input image (col. 2, lines 37-43).

Referring to claim 2, Okabayashi further discloses:

c. a reference partial image production unit which divides the reference image into a plurality of blocks and thereafter produces a reference partial image (col. 18, line 21-col. 19, line 4)

d. an input partial image production unit which divides the input image into a plurality of blocks and thereafter produces an input partial image (col. 2, lines 14-18)

e. a similarity degree calculation unit which calculates the similarity degree between the input partial image and the reference partial image (col. 2, lines 14-34 and col. 18, lines 62-66).

Referring to claim 4, Okabayashi further discloses that the similarity calculation unit defines a normalized correlation coefficient between the input partial image and the reference partial image as a similarity degree (col. 2, lines 14-48 and col. 18, lines 62-66).

Referring to claim 10, see the rejection of at least claim 1 above.

Referring to claim 11, see the rejection of at least claim 2 above.

Art Unit: 2623

Referring to claim 13, see the rejection of at least claim 4 above.

Referring to claim 19, see the rejection of at least claim 1 above.

Referring to claim 20, see the rejection of at least claim 2 above.

Referring to claim 22, see the rejection of at least claim 4 above.

3. Claims 5, 6, 8, 9, 14, 15, 17, 18, 23, 24, 26, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Okabayashi et al., U.S. Patent No. 6,721,462 ("Okabayashi") and Irani et al., U.S. Patent No. 5,146,228 ("Irani").

Referring to claim 5 as best understood, Okabayashi does not explicitly disclose an accumulation addition unit which sequentially accumulation-adds a pixel value of a pixel around each pixel of a plurality of similarity degree images arranged in a predetermined direction to a pixel value of another pixel.

Irani discloses an accumulation addition unit which sequentially accumulation-adds a pixel value of a pixel around each pixel of a plurality of similarity degree images (correlation surfaces) arranged in a predetermined direction to a pixel value of another pixel, and a corresponding point specific unit which specifies corresponding points based on each of similarity degree image accumulatively added by the accumulation addition unit (col. 6, lines 13-59 and figure 4. Note that the correlation level/amplitude is interpreted as a pixel value of a similarity degree image).

Okabayashi and Irani are combinable because they are both concerned with searching corresponding points between an input image and a reference image based on similarity degree images. At the time of the invention, it would have been obvious to a person of ordinary skill in

Art Unit: 2623

the art to include the accumulation addition unit and the corresponding point specific unit of Irani in the image matching system of Okabayashi. The suggestion/motivation for doing so would have been to increase the accuracy and reliability of the image matching process (Irani, col. 5, lines 1-8). Therefore, it would have been obvious to combine Okabayashi with Irani to obtain the invention as specified in claim 5.

Referring to claim 6, Irani further discloses that the accumulation-addition unit recursively repeats accumulation-addition calculation in a horizontal direction, a direction opposite to the horizontal direction, a vertical direction, and a direction opposite to the vertical direction [figure 4. Note that the entire similarity degree images (correlation surfaces) are added together, and therefore the accumulation-addition is performed in a horizontal direction, a direction opposite to the horizontal direction, a vertical direction, and a direction opposite to the vertical direction].

Referring to claim 8, Irani further discloses that the corresponding point specific unit defines a pixel position of pixel whose pixel value of each of similarity degree images additionally added by the accumulation addition unit which becomes maximum, as the corresponding points (col. 6, lines 13-59 and figure 4).

Referring to claim 9, Irani further discloses that the accumulation-addition unit sequentially accumulation-adds each of maximum pixel values (C1 and C2) from among each of pixel values of peripheral pixels (figure 4).

Referring to claim 14, see the rejection of at least claim 5 above.

Referring to claim 15, see the rejection of at least claim 6 above.

Referring to claim 17, see the rejection of at least claim 8 above.

Art Unit: 2623

Referring to claim 18, see the rejection of at least claim 9 above.

Referring to claim 23, see the rejection of at least claim 5 above.

Referring to claim 24, see the rejection of at least claim 6 above.

Referring to claim 26, see the rejection of at least claim 8 above.

Referring to claim 27, see the rejection of at least claim 9 above.

Allowable Subject Matter

4. Claims 3, 12, 21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. Claims 7, 16, and 25 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Lee et al. U.S. Patent No. 6,445,832 discloses a plurality of reference partial images, and a plurality of input partial images each of which are larger than each reference partial image in figure 3B.

Art Unit: 2623

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Kim whose telephone number is 703-306-4038. The examiner can normally be reached on Mon thru Thurs 8:30am to 6pm and alternating Fri 9:30am to 6pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



ck

May 26, 2004



Jon Chang
Primary Examiner